

WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device,
comprising:

forming a protective layer over a polysilicon gate electrode
located over a substrate to provide a capped polysilicon gate
electrode;

forming source/drain regions in said substrate proximate said
capped polysilicon gate electrode;

removing said protective layer using an etchant;

siliciding said polysilicon gate electrode to form a silicided
gate electrode; and

siliciding said source/drain regions.

2. The method as recited in Claim 1 further including
forming a silicide blocking layer over said source/drain regions
prior to said siliciding said polysilicon gate electrode.

3. The method as recited in Claim 2 wherein forming a
silicide blocking layer includes growing a silicide blocking layer
using a dry oxidation process.

4. The method as recited in Claim 2 wherein forming a
silicide blocking layer includes growing a silicide blocking layer

3 using a low temperature radical oxidation or plasma oxidation
4 process.

5. The method as recited in Claim 2 wherein forming a
2 silicide blocking layer includes forming a silicide blocking layer
3 having a thickness ranging from about 2 nm to about 10 nm.

6. The method as recited in Claim 1 wherein said protective
2 layer is a silicon nitride protective layer.

7. The method as recited in Claim 6 further including
2 forming a sidewall spacer adjacent said capped polysilicon gate
3 electrode that includes a nitride layer wherein said nitride layer
4 is of a different chemical composition than said silicon nitride
5 protective layer.

8. The method as recited in Claim 7 wherein said nitride
2 layer has from about 5% to about 10% carbon content.

9. The method as recited in Claim 1 wherein said silicided
2 source/drain regions extend under at least a portion of gate
3 sidewall spacers located adjacent said silicided gate electrode.

10. The method as recited in Claim 1 wherein the protective
2 layer has a thickness ranging from about 5 nm to about 50 nm.

11. A semiconductor device, comprising:

a silicided gate electrode located over a substrate, said silicided gate electrode having gate sidewall spacers located on sidewalls thereof;

source/drain regions located in said substrate proximate said silicided gate electrode; and

silicided source/drain regions located in said source/drain regions and at least partially under said gate sidewall spacers.

12. The semiconductor device as recited in Claim 11 wherein said silicided source/drain regions extend from about 2 nm to about 10 nm under said gate sidewall spacers.

13. The semiconductor device as recited in Claim 11 wherein said silicided source/drain regions have a thickness ranging from about 10 nm to about 30 nm.

14. A method for manufacturing an integrated circuit,
2 comprising:

3 forming semiconductor devices over a substrate, including;
4 forming a protective layer over a polysilicon gate
5 electrode located over said substrate to provide a capped
6 polysilicon gate electrode;

7 forming source/drain regions in said substrate proximate
8 said capped polysilicon gate electrode;

9 removing said protective layer using an etchant;

10 siliciding said polysilicon gate electrode to form a
11 silicided gate electrode; and

12 siliciding said source/drain regions; and

13 forming interconnects within dielectric layers located over
14 said substrate for electrically contacting said semiconductor
15 devices.

15. The method as recited in Claim 14 further including
2 forming a silicide blocking layer over said source/drain regions
3 prior to said siliciding said polysilicon gate electrode.

16. The method as recited in Claim 15 wherein forming a
2 silicide blocking layer includes growing a silicide blocking layer
3 using a dry oxidation process.

17. The method as recited in Claim 15 wherein forming a silicide blocking layer includes growing a silicide blocking layer using a low temperature radical oxidation or plasma oxidation process.

18. The method as recited in Claim 15 wherein forming a silicide blocking layer includes forming a silicide blocking layer having a thickness ranging from about 2 nm to about 10 nm.

19. The method as recited in Claim 14 wherein said protective layer is a silicon nitride protective layer.

20. The method as recited in Claim 19 further including forming a sidewall spacer adjacent said capped polysilicon gate electrode that includes a nitride layer wherein said nitride layer is of a different chemical composition than said silicon nitride protective layer.

21. The method as recited in Claim 20 wherein said nitride layer has from about 5% to about 10% carbon content.

22. The method as recited in Claim 14 wherein said silicided source/drain regions extend under at least a portion of gate sidewall spacers located adjacent said polysilicon gate electrode.

23. The method as recited in Claim 14 wherein the protective
2 layer has a thickness ranging from about 5 nm to about 50 nm.